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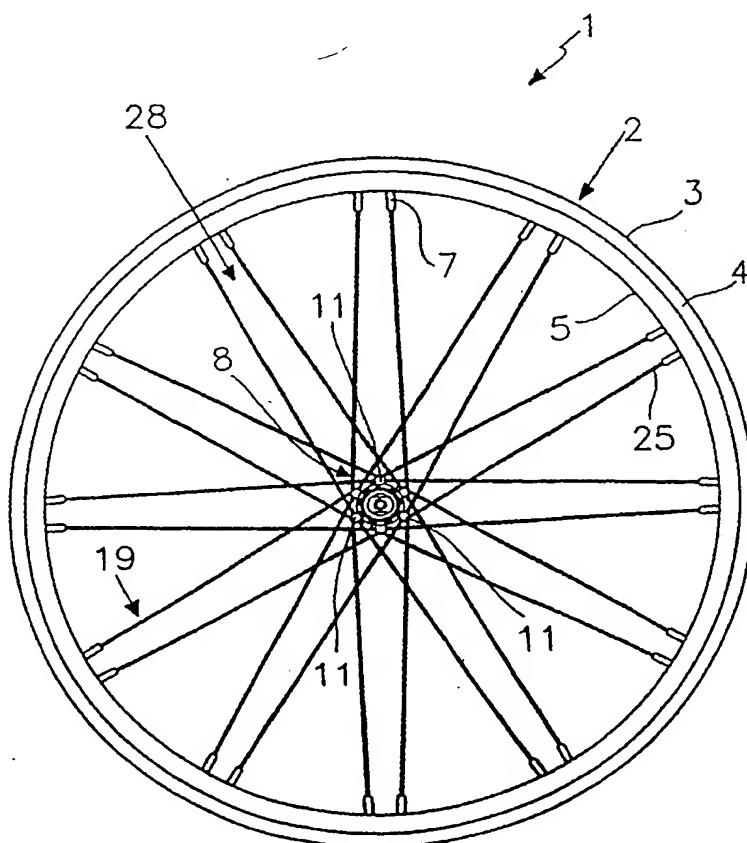
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[Continued on next page]

(54) Title: BICYCLE WHEEL PARTICULARLY FOR RACING AND/OR MOUNTAIN BICYCLES



(57) Abstract: A bicycle wheel (1), particularly for racing and/or mountain bicycles, comprising a rim (2) which is coaxially connected to a hub (8) by means of a plurality of spokes (19) that converge on a pair of flanges (9, 10) that are coaxial to the hub, the flanges comprising coupling lugs (11) distributed on the peripheral region of the flanges and provided with tangential coupling holes (13, 14) that engage, the spokes (19) having an end (20) that engages the holes (13, 14) and an opposite end (25) that is connected to nipples (7) for coupling to the rim (2).

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- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

BICYCLE WHEEL PARTICULARLY FOR RACING AND/OR MOUNTAIN BICYCLES

Technical Field

The present invention relates to a bicycle wheel, particularly for racing and/or mountain bicycles, provided with a rim of the tubeless or the conventional type.

Background Art

Bicycle wheels are already known which are constituted by a rim and by a plurality of spokes that converge toward the wheel hub and are suitable to contrast the stresses transmitted by the rim. The rim forms, on opposite faces, a space for retaining the tire at the outer face and coupling holes on the inner face, which is directed toward the hub; the nipples for connection to the straight ends of the spokes are driven through said holes. The hub coaxially supports two flanges, each of which is provided with radial holes in which the folded ends of the spokes are inserted.

It has been found that the spokes of the wheels have, at their folded end, problems related to resistance to the mechanical stresses transmitted by the wheel.

Another problem arises from the fact that in order to increase resistance to said stresses it is necessary to use a number of spokes that ensure a certain strength. This number of spokes is in any case such as to have a negative effect on the wheel, which is impaired by it in terms of performance owing to the inertial mass and in terms of balance and control due to the gyroscopic effect.

Disclosure of the Invention

The aim of the present invention is to obviate the above cited drawbacks, by providing a bicycle wheel wherein the spokes of the wheel do not have problems related to resistance to mechanical stresses.

Within this aim, an object of the present invention is to provide a light wheel without thereby affecting resistance to mechanical stresses and

actually improving it.

Another object of the present invention is to provide a wheel that is simple, relatively easy to provide in practice, safe in use, effective in operation, and has a relatively low cost.

This aim and these and other objects that will become better apparent hereinafter are achieved by the present bicycle wheel, particularly for racing and/or mountain bicycles, comprising a rim which is coaxially connected to a hub by means of a plurality of spokes that converge on a pair of flanges that are coaxial to said hub, characterized in that said flanges comprise coupling lugs distributed on a peripheral region of said flanges and provided with tangential coupling holes, said spokes having an end that engages said coupling holes and an opposite end that is connected to nipples for coupling to said rim.

Brief Description of the Drawings

Further characteristics and advantages of the invention will become better apparent from the following detailed description of a preferred but not exclusive embodiment of a bicycle wheel, particularly for racing and/or mountain bicycles, according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

- 20 Figure 1 is a side elevation view of the wheel according to the invention;
- Figure 2 is a detail view of the hub of Figure 1;
- Figure 3 is a longitudinal view of the hub;
- Figures 4 and 5 are partially sectional views of a portion of the flange respectively in a pre-mounting position and in a mounting position;
- 25 Figure 6 is a sectional view, taken along the line VI-VI of Figure 4;
- Figure 7 is a partially sectional view of a nipple;
- Figure 8 is a view of a second embodiment of the hub;
- Figure 9 is an enlarged-scale view of the coupling holes;
- Figure 10 is an enlarged-scale view of the end of said spoke;
- 30 Figures 11 and 12 are partially sectional views of a portion of the flange

in a pre-mounting position and in a mounting position.

Ways of carrying out the Invention

With particular reference to the figures, the reference numeral 1 generally designates a wheel according to the invention.

5 The wheel 1 comprises a rim 2, which is constituted by a profiled element that is curved into a circle and forms, at an outer face 3, an open recess 4 in which the tire is retained and forms, at an inner face 5 directed toward the center, coupling seats 6 in which nipples 7 are inserted. At the center of the wheel 1, coaxially to the rim 2, there is a hub 8 that supports, in its lateral
10 median region, two flanges 9 and 10 that are coaxial to the hub 8. Each one of the flanges 9 and 10 comprises, on its peripheral region, coupling lugs 11 which are distributed thereon with a substantially constant pitch. The coupling lugs 11 are provided with two tangent coupling holes 13 and 14. Each one of the coupling holes 13 and 14 has, at respective mutually
15 opposite inlets 15 and 16, corresponding flared regions 17 provided with diametrically opposite slits, not shown.

The inlets 15 and 16 of the coupling holes 13 and 14 are suitable to be crossed, in opposite directions, by respective spokes 19. The spokes 19 form, at one end 20, a head 21, which has a V-shaped cross-section and is provided
20 with rotation-preventing means suitable to block the rotation of the spokes 19 when they engage the coupling holes 13 and 14. The rotation-preventing means consists of a pair of wings 22 and 23, which complementarily engage the slits of the flared regions 17. The spokes 19 have, at an opposite end 25, a thread that is suitable to engage a threaded seat 26 of the nipples 7.
25 Advantageously, the seat 26 is coated with a film 27 of friction-generating material, which blocks the rotation of the spokes 19.

The spokes 19 are fixed between the rim 2 and the hub 8 in an arrangement in which spokes 19 form, in pairs, solid spokes 28, which diverge from the rim 2 toward the hub 8, so as to rigidly form the wheel 1
30 according to the invention.

In practical operation, assembly of the wheel 1 is straightforward, since it is sufficient to insert, tangentially with respect to the flanges, in each one of the coupling holes 13 and 14, the respective spokes 19 which, by engaging with the opposite end 25 in the seat 26 of the nipple 7 and with the head 21 in the flared region 17 provide the rigid connection between the hub 8 and the rim 2.

It has thus been observed that the invention achieves the intended aim and objects.

In particular, the fact is stressed that the spokes are more rigid than those used traditionally because they have a straight and rotation-preventing head 21, leading to an increased overall resistance of the wheel to stresses.

Another aspect is that the use of self-locking nipples improves the characteristics of resistance to vibrations and to loosenings caused by spoke-hub-rim adaptations.

Another aspect is that the particular arrangement of the spoke system allows to reduce the number of spokes, with advantages in terms of wheel weight and in terms of gyroscopic effect reduction.

The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

Advantageously, a different embodiment is provided regarding the coupling holes 13, 14 and the end 20 of the spoke 19. The end 20 has a head 21 that is shaped like a truncated pyramid; complementarily with respect to the head 21, the coupling holes 13 and 14 have inlets 15 and 16 whose cross-section is complementary to the head 21. In this manner, when the spokes 19 are inserted in the coupling holes 13 and 14, they remain rotationally locked with the head 21 inside the inlets 15 and 16. The locking of the spoke 19 by means of this different solution is highly effective and allows to screw the nipple 7 easily onto the other end of the spoke 19.

All the details may further be replaced with other technically equivalent ones.

In practice, the materials used, as well as the shapes and the dimensions, may be any according to requirements without thereby abandoning the scope of the protection of the appended claims.

The disclosures in Italian Patent Application No. BO2000A000746 from 5 which this application claims priority are incorporated herein by reference.

CLAIMS

1. A bicycle wheel (1), particularly for racing and/or mountain bicycles, comprising a rim (2) which is coaxially connected to a hub (8) by means of a plurality of spokes (19) that converge on a pair of flanges (9,10) that are coaxial to said hub, characterized in that said flanges comprise coupling lugs (11) distributed on the peripheral region of said flanges and provided with tangential coupling holes (13,14), said spokes having an end (20) that engages said holes (13,14) and an opposite end (25) that is connected to nipples (7) for coupling to said rim (2).
5
- 10 2. The wheel according to claim 1, characterized in that said end (20) that engages said holes forms a head (21) having a V-shaped cross-section, provided with rotation-preventing means suitable to block the rotation of said spokes (19) in said coupling holes (13,14).
- 15 3. The wheel according to claim 1, characterized in that said nipples (7) are coated internally with a film (27) of rotation-preventing material in order to block the rotation of said spokes (19).
- 20 4. The wheel according to claim 1, characterized in that said coupling lugs (11) are distributed on the peripheral region of said flanges (9,10) with a substantially constant pitch.
- 25 5. The wheel according to one or more of the preceding claims, characterized in that said coupling holes (13,14) are two, each one forming, at mutually opposite inlets (15,16), a flared portion (17) that is complementary to said head (21).
6. The wheel according to one or more of the preceding claims, characterized in that said inlets (15,16) are suitable to receive respective spokes (19) in mutual opposition.
25
7. The wheel according to one or more of the preceding claims, characterized in that said rotation-preventing means comprise two wings (22,23) which engage complementarily slits provided in said flared portions.
- 30 8. The wheel according to one or more of the preceding claims,

characterized in that said spokes (19) are fixed between said rim (2) and said hub (8) according to an arrangement in which said spokes (19) form, in pairs, solid spokes (28) that diverge from said rim (2) toward said hub (8).

9. The wheel according to claim 1, characterized in that said end (20) that
5 engages said holes forms a head (21) shaped like a truncated pyramid.

10. The wheel according to one or more of the preceding claims,
characterized in that said coupling holes (13,14) have inlets (15,16) whose
cross-section is complementary to said head (21), said head being suitable to
engage in said inlets so that said spoke (19) remains rotationally locked.

FIG 1

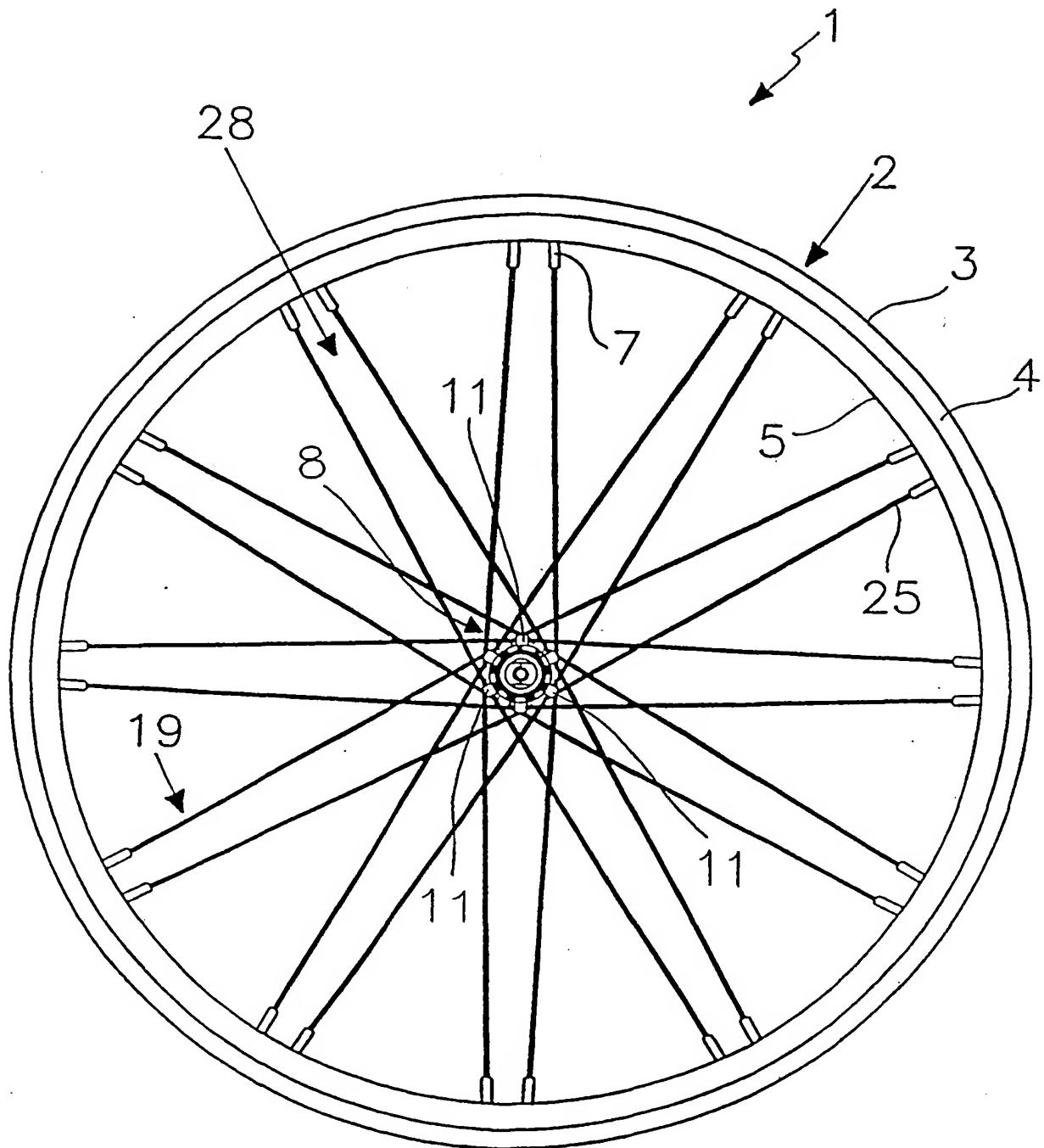


FIG 2

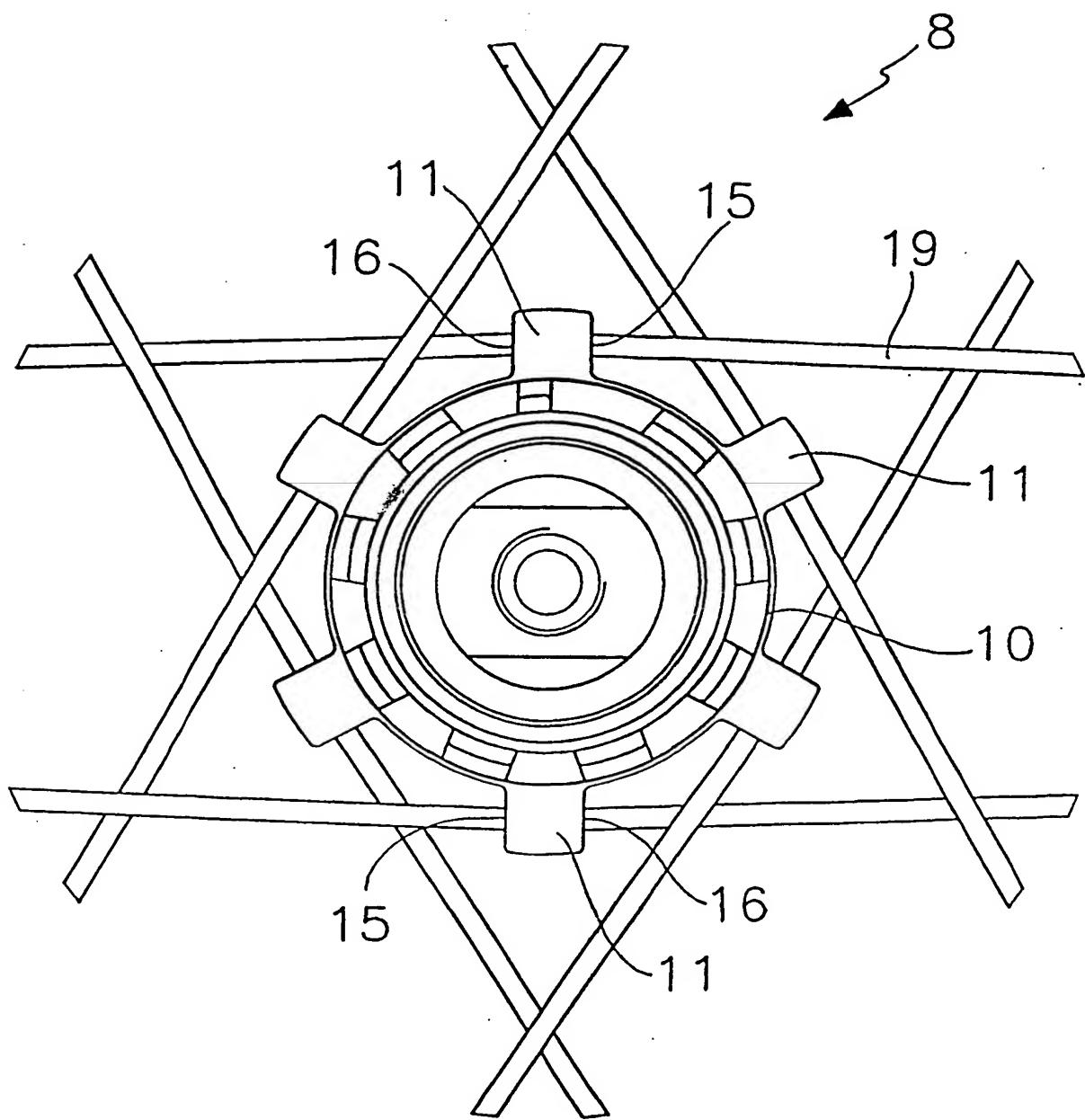


FIG 3

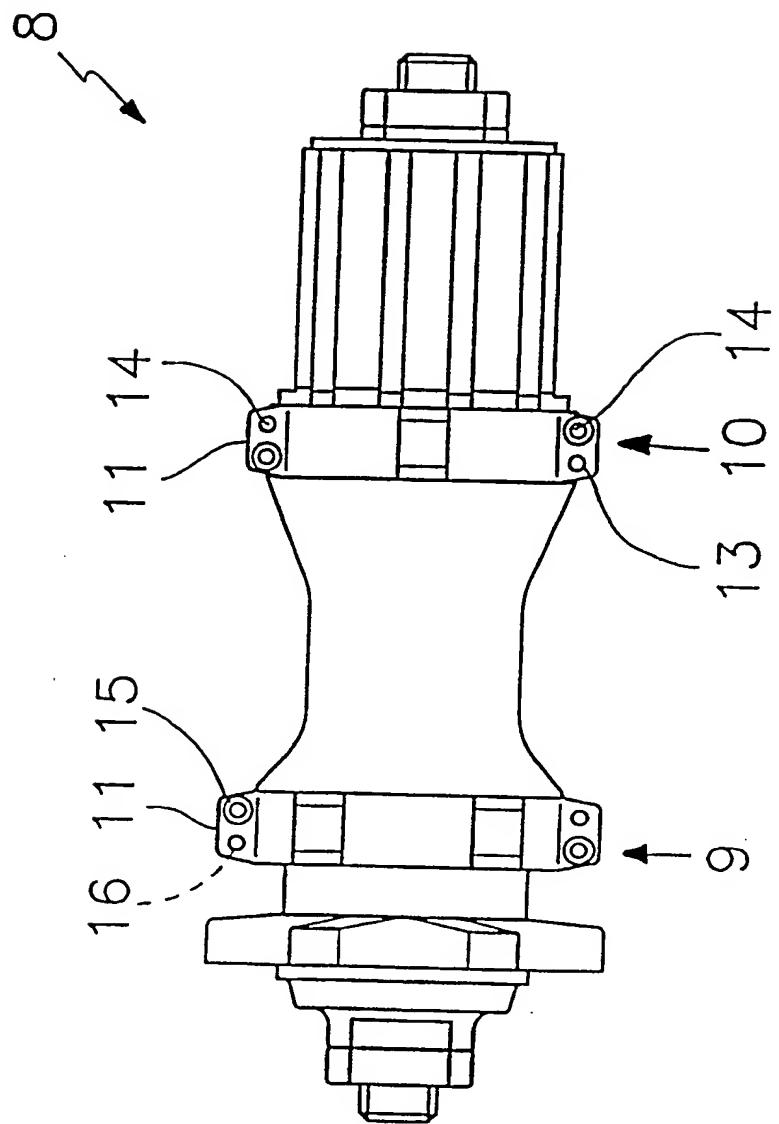


FIG 6

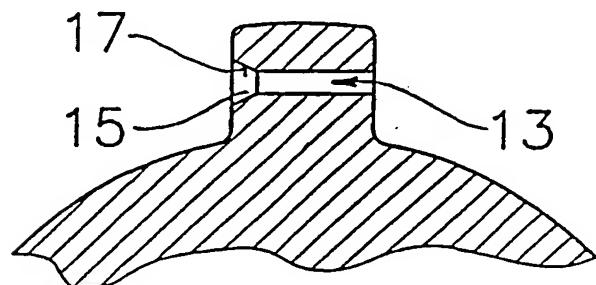
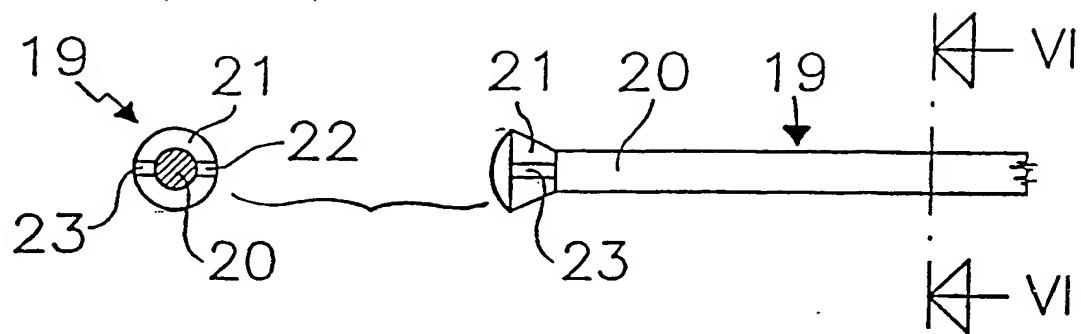


FIG 4

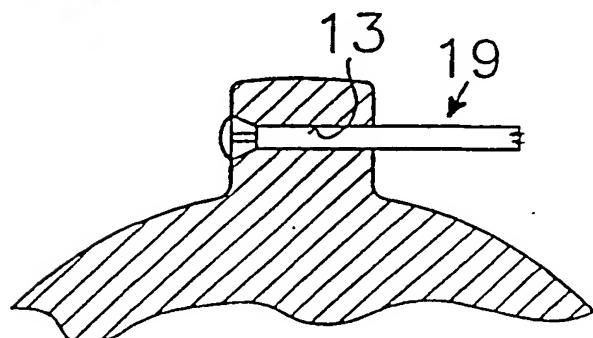


FIG 5

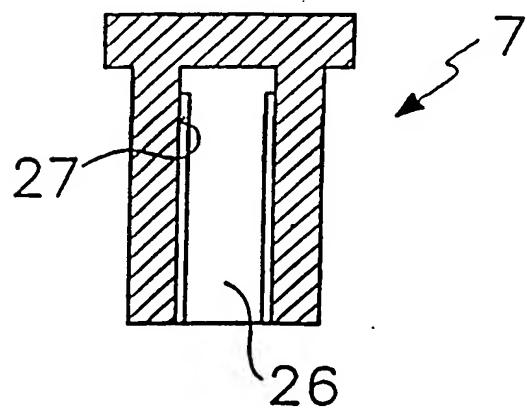


FIG 7

FIG 9

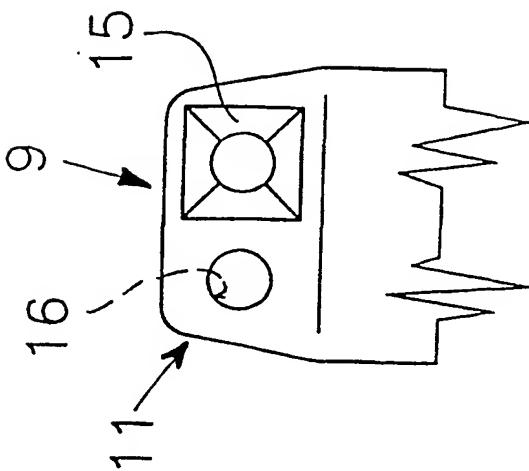


FIG 8

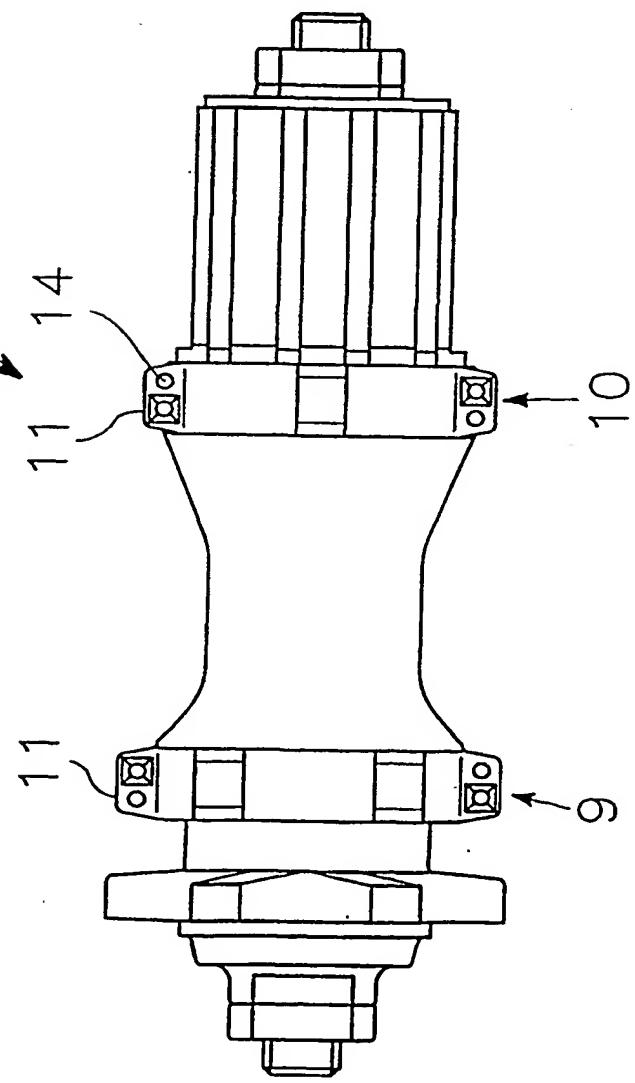


FIG 10

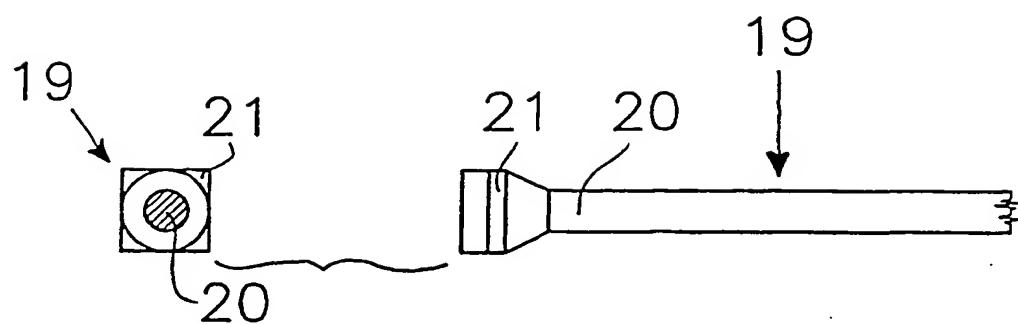


FIG 11

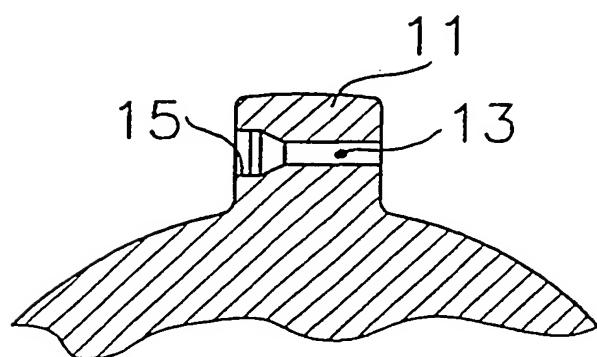
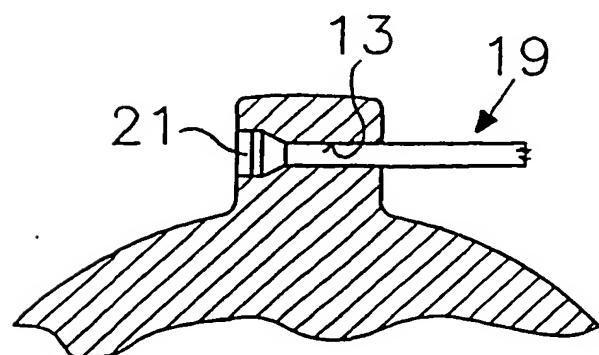


FIG 12



INTERNATIONAL SEARCH REPORT

International application No.

PCT/EP 01/14949

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B60B 1/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B60B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI DATA, EPO-INTERNAL, PAJ, EPODOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 478394 A (J.S. BRETZ), 5 July 1892 (05.07.92), figures 1-5, abstract, the whole document --	1-10
X	FR 2640203 A1 (GALARDO PATRICK), 15 June 1990 (15.06.90), figures 3-6, abstract, the whole document --	1-10
A	WO 0061387 A1 (DT SWISS AG), 19 October 2000 (19.10.00), abstract --	3

 Further documents are listed in the continuation of Box C. See patent family annex.

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Date of the actual completion of the international search

25 April 2002

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INTERNATIONAL SEARCH REPORT

International application No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 420061 A (O. HANSON), 28 January 1890 (28.01.90), figures 1-5, abstract, the whole document -- -----	2,7,9,10

INTERNATIONAL SEARCH REPORT

Information on patent family members

28/01/02

International application No.

PCT/EP 01/14949

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US 478394 A	1892	NONE		
FR 2640203 A1	15/06/90	NONE		
WO 0061387 A1	19/10/00	DE 19916046 A EP 1169182 A DE 19952929 A DE 10002528 A	19/10/00 09/01/02 10/05/01 26/07/01	
US 420061 A	1890	NONE		